

Information Disclosure Statement**Concurrently Submitted**

Applicants are concurrently filing an Information Disclosure Statement containing additional citations. Pursuant to the provisions of MPEP 609, Applicants request that a copy of the Form 1449, initialed as being considered by the Examiner, be returned to the Applicants with the next official communication.

**Rejection of Claims 1-10 and 28-50 Under 35 U.S.C. § 103(a)
as Unpatentable over Arima in View of Branchevsky**

Claims 1-10 and 28-50 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Arima et al. (U.S. Patent No. 5,281,151) in view of Branchevsky (U.S. Patent No. 6,252,761).

Arima discloses a first multi-layer wiring conductor in the form of a multi-layer ceramic board 2, and a second multi-layer wiring conductor in the form of a thin-film circuit board 3 having laminated organic layers (see col. 2, line 65 through col. 3, line 22 and FIG. 1). An integrated circuit 9 is mounted on the thin film circuit 3. It is noted that Arima does not appear to contain any disclosure concerning an internal capacitor.

Branchevsky discloses a multi-layer ceramic capacitor 100 (FIG. 9, see col. 4, lines 16-18). One set of electrodes (110, 118, and 126) and a second set of electrodes (114 and 122) are separated by dielectric layers (112, 116, 120, and 124). A via 128 contacts the left-hand side (as seen in FIG. 9) of electrodes 110/118/126, and a via 130 contacts the right-hand side of electrodes 114/122. Also, in FIGS. 1-8 of Branchevsky, various prior art structures of ceramic substrates having embedded capacitors are shown. It is noted that Branchevsky does not appear to contain any disclosure concerning an organic substrate.

The Examiner stated that, regarding claims 2, 4, 6, 32, 34, and 36, the “method steps are corresponding to the obvious rejection of the structural apparatus” [sic]. Applicants respectfully cannot understand this statement, because none of the claims currently pending in this application are method claims or contain method steps, and Applicants respectfully request that the Examiner clarify this statement in the next official communication.

The Examiner further stated that it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the substrate design of Branchevsky with Arima's substrate for the purpose of increasing capacitance.

Applicants respectfully disagree for the reasons set forth below.

To establish a *prima facie* case of obviousness, there must be some teaching, suggestion, or motivation in the references, or in the knowledge generally available to one of ordinary skill in the art, to combine them to arrive at Applicants' claimed subject matter.

Independent claim 1 recites *inter alia* a multilayer substrate comprising a ceramic portion having an embedded capacitor, and an organic portion comprising a plurality of conductors. There is no suggestion or motivation in Branchevsky or Arima for combining these references to arrive at the subject matter claimed in claim 1. As pointed out earlier, Branchevsky does not appear to contain any disclosure concerning an organic substrate, nor any suggestion of combining an organic substrate with the ceramic substrate shown in Branchevsky. Nor does Arima appear to contain any disclosure concerning providing an internal capacitor. Applicants respectfully assert that the suggested combination of Arima and Branchevsky is based solely upon hindsight and would not have been suggested but for Applicants' own disclosure.

The Examiner asserts that "a skilled artisan would have been motivated to use both the capacitor embedded in the organic material layers of Branchevsky ceramic with the multilayer board design of Arima et al. to provide the benefits of superior component response with reduced signal transmission" [emphasis added]. In response, Applicants assert that Branchevsky does not appear to contain any disclosure concerning an organic substrate or "organic material layers". Further, Applicants assert that a person of ordinary skill in the art would not comprehend what the Examiner means by "superior component response with reduced signal transmission", whether now or at the time Applicants' subject matter was conceived.

Thus, Applicants respectfully assert that a *prima facie* case of obviousness has not been established. First, the Examiner has not provided any teaching, suggestion, or motivation in the references themselves. Secondly, the Examiner has not provided any credible teaching, suggestion, or motivation in the knowledge generally available to one of ordinary skill in the art,

to combine the Branchevsky and Arima references to arrive at Applicants' claimed subject matter.

Regarding the issue of when it is reasonable to combine references to establish obviousness, the Examiner is referred to *In Re Sang Su-Lee*, Serial No. 07/631,240, CAFC, 00-1158, January 18, 2002 (copy attached).

On page 7, beginning line 19, the CAFC stated:

“ ‘The factual inquiry whether to combine references must be thorough and searching.’ *Id.* It must be based on objective evidence of record.”

On page 9, beginning line 1, the CAFC stated:

“ . . . the examiner can satisfy the burden of showing obviousness of the combination ‘only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references’ ”.

In the present case, Applicants respectfully assert that the Examiner has not produced any convincing objective evidence to support his position that it would have been obvious to combine the teaching of Arima and Branchevsky. Applicants assert that the Examiner's suggested combination of Arima and Branchevsky is based solely upon hindsight and would not have been suggested but for Applicants' own disclosure.

For the above reasons, independent claim 1 should be found to be allowable over any combination of Arima and Branchevsky, and Applicants respectfully request that the rejection of claim 1 under 35 U.S.C. §103(a) as being unpatentable over Arima in view of Branchevsky should be withdrawn.

Claims 2-10, which depend from claim 1, directly or indirectly, and incorporate all of the limitations therein, are also asserted to be allowable for the reasons presented above.

Independent claim 28 recites a method for making a substrate to package a die. The method comprises *inter alia* forming a first portion of the substrate using ceramic materials and including at least one capacitor between upper and lower surfaces of the first portion. The

method further comprises *inter alia* forming a second portion of the substrate using organic materials, the second portion overlying the first portion.

Again, there is no suggestion or motivation in Branchevsky or Arima for combining these references to arrive at the subject matter claimed in claim 28. As pointed out earlier, Branchevsky does not appear to contain any disclosure concerning forming an organic substrate, or combining an organic substrate with the ceramic substrate shown in Branchevsky. Nor does Arima appear to contain any disclosure concerning including an internal capacitor within the ceramic substrate. Nor has the Examiner provided any credible teaching, suggestion, or motivation in the knowledge generally available to one of ordinary skill in the art to combine the Branchevsky and Arima references. Applicants respectfully assert that the suggested combination of Arima and Branchevsky is based solely upon hindsight and would not have been suggested but for Applicants' own disclosure.

For the above reasons, independent claim 28 should be found to be allowable over any combination of Arima and Branchevsky, and Applicants respectfully request that the rejection of claim 28 under 35 U.S.C. §103(a) as being unpatentable over Arima in view of Branchevsky should be withdrawn.

Claims 29-30, which depend from claim 28 and incorporate all of the limitations therein, are also asserted to be allowable for the reasons presented above.

Independent claim 31 recites *inter alia* a multilayer substrate comprising a ceramic portion including a capacitor located between upper and lower surfaces, and an organic portion comprising a plurality of conductors. Again, there is no suggestion or motivation in Branchevsky or Arima for combining these references to arrive at the subject matter claimed in claim 31. As pointed out earlier, Branchevsky does not appear to contain any disclosure concerning an organic substrate, or combining an organic substrate with the ceramic substrate shown in Branchevsky. Nor does Arima appear to contain any disclosure concerning including an internal capacitor within the ceramic substrate. Nor has the Examiner provided any credible teaching, suggestion, or motivation in the knowledge generally available to one of ordinary skill in the art to combine the Branchevsky and Arima references. Applicants respectfully assert that

the suggested combination of Arima and Branchevsky is based solely upon hindsight and would not have been suggested but for Applicants' own disclosure.

For the above reasons, independent claim 31 should be found to be allowable over any combination of Arima and Branchevsky, and Applicants respectfully request that the rejection of claim 31 under 35 U.S.C. §103(a) as being unpatentable over Arima in view of Branchevsky should be withdrawn.

Claims 32-40, which depend from claim 31, directly or indirectly, and incorporate all of the limitations therein, are also asserted to be allowable for the reasons presented above.

Independent claim 41 recites *inter alia* a multilayer substrate comprising a ceramic portion including a capacitor located between upper and lower surfaces, and an organic portion comprising a plurality of conductors. The capacitor includes a plurality of conductive layers interleaved with insulating layers. The plurality of conductive layers comprise a first plurality of conductive layers to be at a first potential, and a second plurality of conductive layers to be at a second potential.

Independent claim 41 additionally recites that selected ones of the first plurality of conductive layers are electrically coupled to at least a first via that penetrates an adjacent one of the second plurality of conductive layers without electrically contacting same. Selected ones of the second plurality of conductive layers are electrically coupled to at least a second via that penetrates an adjacent one of the first plurality of conductive layers without electrically contacting same.

The capacitor structure recited in independent claim 41 is not shown or described in Branchevsky, which is the only reference the Examiner applied that discloses any type of capacitor. To establish a *prima facie* case of obviousness, the references when combined must teach or suggest all of the claim limitations.

Further, there is no suggestion or motivation in Branchevsky or Arima for combining these references to arrive at the subject matter claimed in new claim 41. As pointed out earlier, Branchevsky does not appear to contain any disclosure concerning an organic substrate, or combining an organic substrate with the ceramic substrate shown in Branchevsky. Nor does

Arima appear to contain any disclosure concerning including an internal capacitor within the ceramic substrate. Nor has the Examiner provided any credible teaching, suggestion, or motivation in the knowledge generally available to one of ordinary skill in the art to combine the Branchevsky and Arima references. Applicants respectfully assert that any suggested combination of Arima and Branchevsky would be based solely upon hindsight and would not have been suggested but for Applicants' own disclosure.

For the above reasons, independent claim 41 should be found to be allowable over any combination of Arima and Branchevsky. Claims 42-50, which depend, directly or indirectly, from claim 41 and incorporate all of the limitations therein, are also asserted to be allowable for the reasons presented above.

Additional Elements and Limitations

Applicants consider additional elements and limitations of claims 1-10 and 28-50 to further distinguish over the cited references, and Applicants reserve the right to present arguments to this effect at a later date.

Documents Cited But Not Relied Upon For This Office Action

Applicants need not respond to the assertion of pertinence stated for the references cited but not relied upon by the Office Action, because these references are not made part of the rejections in this Office Action. Applicants are expressly not admitting to this assertion and reserve the right to address the assertion should it form part of future rejections.

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Title: ELECTRONIC ASSEMBLY COMPRISING CERAMIC/ORGANIC HYBRID SUBSTRATE WITH EMBEDDED CAPACITORS AND METHODS OF MANUFACTURE

Assignee: Intel Corporation

Conclusion

Applicants respectfully submit that claims 1-10 and 28-50 are in condition for allowance, and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicants' attorney, Walter W. Nielsen at (602) 298-8920, or the below-named attorney to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

Respectfully submitted,

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Date June 27, 2003

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CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: Mail Stop RCE, Commissioner of Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on this 27 day of June, 2003

KACIA LEE

Name

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Signature